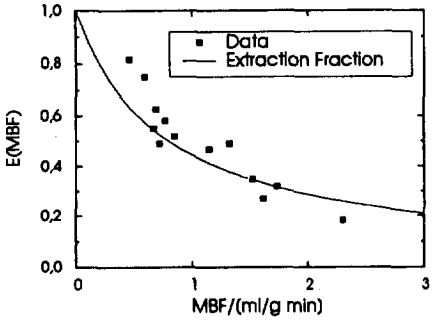

1011-117 Comparison of ^{82}Rubidium Positron Emission Tomography to ^{99}Technetium-Methoxyisobutyl Isonitrile Perfusion Imaging

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This study was designed to prospectively compare myocardial perfusion imaging with rubidium-82 (^{82}Rb) by positron emission tomography (PET) to technetium-99^{m} — methoxyisobutyl isonitrile (MIBI) by single photon emission computed tomography (SPECT). Detection of inducible ischemia and prior infarction was assessed in 53 patients (pts) with known coronary artery disease (CAD) who had undergone quantitative coronary angiography. To assign independently myocardial viability both techniques were compared to resting, glucose loaded myocardial uptake of fluorine-18 fluorodeoxyglucose (FDG) PET in a subgroup of 27 pts. with left ventricular wall motion abnormalities. Intravenous dipyridamole vasodilatation (0.7 mg/kg) was used as myocardial stress modality, with ^{82}Rb and MIBI being injected simultaneously under identical hemodynamic conditions. SPECT and PET results were scored in a 13 segment model of the left ventricle as normal, inducible ischemia, infarction or infarction with adjacent ischemia. There were concordant findings in 48 out of 53 analysed pts. (91%). However, in 5 pts. (9%) MIBI-SPECT showed fixed perfusion defects but ischemia by ^{82}Rb-PET and evidence of viable myocardium with FDG-PET, whereas there was no segment with infarction in ^{82}Rb-PET and ischemia in SPECT. We conclude that MIBI-SPECT detects less inducible ischemia but more fixed perfusion defects compared to ^{82}Rb-PET in the same patient population. Sensitivity of stress/rest ^{82}Rb-PET in detection of $\geq$70% stenosed vessel was 33/33 (100%) in LAD territory respectively 31/32 (97%) in LCx/RCA territory with specificity of 93%. MIBI SPECT sensitivity in the same group was 29/33 (88%) for LAD and 31/32 (97%) for LCx/RCA territory with specificity of 90% in LAD territory respectively 71% in LCx/RCA. These data strongly suggest that MIBI-SPECT underestimates the presence of ischemic and still viable myocardium in comparison to ^{82}Rb- and FDG-PET. In contrast myocardial viability as assessed by ^{82}Rb- and FDG-PET correlated well. Thus stress/rest ^{82}Rb-PET holds promise for reliable assessment of reversible ischemia and myocardial viability.

1011-118 Blood Flow Regulation in Collateral Dependent Myocardium

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Myocardial blood flow (MBF) regulation in collateral dependent myocardium (CD) of patients with coronary artery disease has not been fully elucidated. To this purpose, 19 patients with stable angina, no previous myocardial infarction and isolated occlusion of the left anterior descending (n = 14) or left circumflex (n = 5) coronary artery were evaluated. MBF measurements were obtained off-therapy, using dynamic positron emission tomography and nitrogen-13 Ammonia, at baseline, during atrial pacing tachycardia and after i.v. dipyridamole (0.56 mg/kg over 4 min). MBF in CD and remote regions were compared with MBF values obtained in 13 normal subjects. At rest, MBF was similar in CD and in the remote myocardium (0.61 $\pm$ 0.11 vs 0.63 $\pm$ 0.17 ml/min/g), both values were lower than normal (1.00 $\pm$ 0.2 ml/min/g, $p < 0.01$). During pacing MBF increased to 0.84 $\pm$ 0.25 and 1.11 $\pm$ 0.39 ml/min/g in CD and contralateral areas, respectively ($p < 0.05$ vs baseline); both these values were lower ($p < 0.01$) than normal (1.86 $\pm$ 0.61 ml/min/g). Dipyridamole induced a further increase in MBF in remote areas (1.36 $\pm$ 0.57 ml/min/g, $p < 0.01$ vs pacing) but not in CD (0.93 $\pm$ 0.37 ml/min/g, ns vs pacing); both values were reduced ($p < 0.01$) with respect to normals (3.46 $\pm$ 0.78 ml/min/g). Dipyridamole MBF in CD was slightly lower in patients with poor than in those with well developed collaterals (0.75 $\pm$ 0.29 vs 1.06 $\pm$ 0.38 ml/min/g, respectively, $p = 0.06$), however, the former showed a higher flow inhomogeneity (CD/control flow ratio: 0.58 $\pm$ 0.10 vs 0.81 $\pm$ 0.22, respectively, p $\pm$ 0.02). Despite so different coronary anatomy (one vessel occluded the other normal), a linear, direct correlation was observed between flow reserve of CD and remote regions ($r = 0.83$, $p < 0.01$). Thus, despite resting hypoperfusion, CD maintains a residual perfusion reserve that can be almost fully utilized during moderate increases in oxygen consumption. A global microvascular disorder affects the adaptation to chronic coronary occlusion.

1011-119 Effect of Nisoldipine on Hypoperfused Dyssynergic Viable Myocardium After Myocardial Infarction

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After infarction, regional dysfunction can occur in still viable myocardial regions because of the presence of baseline hypoperfusion. Recent evidence suggests that these areas may maintain a residual perfusion reserve. Aim of this study was to evaluate whether oral Nisoldipine can increase regional myocardial myocardial blood flow (MBF) in dyssynergic but viable myocardium after myocardial infarction. To this purpose, 15 patients with isolated left anterior descending coronary (LAD) stenosis were studied 1 month after first myocardial infarction. Patients underwent F18-deoxiglucose imaging, while MBF was measured, using positron emission tomography and 13N-Ammonia, at baseline and following dobutamine (10 μcg/kg/min over 5 minutes, DOB). MBF measurements were repeated 24 hours later after Nisoldipine (10 mg bid). Among a total of 102 LAD related regions, 23 showed normal wall motion at 2D-echo and normal metabolic activity (Normal), 58 showed wall motion abnormality and preserved deoxiglucose uptake (Viable), while 21 dyssynergic regions were necrotic (Necrotic). MBF data (ml/mm/100 g) were as follows:

	Before Nisoldipine		After Nisoldipine	
	Basal MBF	DOB MBF	Basal MBF	DOB MBF
Normal	92 $\pm$ 23	119 $\pm$ 38	85 $\pm$ 18	121 $\pm$ 46°
Viable	62 $\pm$ 25†	93 $\pm$ 40$^{\dagger,\circ}$	73 $\pm$ 25$^{\wedge}$	102 $\pm$ 51°
Necrotic	46 $\pm$ 24$^{\dagger,@}$	51 $\pm$ 25$^{\dagger,@}$	52 $\pm$ 20$^{\dagger,@}$	56 $\pm$ 28$^{\dagger,@}$

$^{\dagger}p < 0.05$ vs Normal, $^{@}p < 0.05$ vs Viable, $^{\circ}p < 0.05$ vs relative Basal, $^{\wedge}p < 0.05$ vs Basal before Nisoldipine

Necrotic areas showed the largest reduction in baseline MBF. Dyssynergic viable regions showed a reduced resting MBF, but maintained a residual perfusion reserve in response to inotropic stimulation. Thus, Nisoldipine selectively improved basal perfusion in dysynergic viable myocardium.

1012 Vascular Biology/Thrombosis

Wednesday, March 22, 1995, Noon–2:00 p.m.
Ernest N. Morial Convention Center, Hall E
Presentation Hour: Noon–1:00 p.m.

1012-101 Vascular Smooth Muscle-Directed Adenoviral Vectors

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Gene transfer to the vascular wall utilizing locally-delivered recombinant adenoviral vectors has shown promise as a novel technique for therapeutic as well as experimental modulation of vascular wall gene expression. Infusion of such vectors using porous balloon catheters (PBC) has previously been demonstrated to result in transduction of extravascular cells at the delivery site, as well as substantial systemic transduction as a consequence of release of vector into the circulation. Introduction of a vascular-directed promoter into the adenoviral vector should thus contribute to targeting the expression of genes to the vascular wall, while reducing peri-vascular and systemic expression. In order to test the feasibility of utilizing the vascular smooth muscle α-actin (SMA) promoter to confer tissue specificity upon a recombinant adenoviral vector, we constructed an adenovirus (AvLacZ5) employing a 1.1 kilobase region of the murine SMA promoter to direct the expression of the nuclear-targeted beta-galactosidase (lacZ) gene and evaluated gene transduction by this vector, in comparison with a vector differing only by the presence of the RSV-LTR promoter. Several cell types were used as targets, including bovine aortic smooth muscle cells (BASMC), human pulmonary epithelial carcinoma cells (A549 cells), and transformed human